

**ABSTRACT**

Methods and apparatus, including computer program products, mass spectrometry systems, and sample plates for use in such systems, implement techniques for calibrating an ion source that includes a sample control system including a sample holder and a laser  
5 source. A sample plate is mounted in the sample holder, and a relationship is determined between a coordinate system of the sample plate and a coordinate system of the sample control system. The relationship is used to align a target region of the sample plate with ion optics of a mass spectrometer for a mass spectrometric analysis. The relationship is determined at least in part by aligning one or more fiducials relative to a reference point of  
10 the sample control system. The fiducials define reference points of the sample plate coordinate system. The techniques can be used to facilitate processes involving partial or full automation.

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